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GOVERNMENT OF THE PROVINCE OF ALBERTA

ANNUAL REPORT

OF THE

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING

DECEMBER 31, 1970

EDMONTON

H. P. CAMERON

ACTING CHAIRMAN

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February 12, 1971

The Honourable R. S. Ratzlaff
Minister of Industry & Tourism
Legislative Building
EDMONTON, Alberta

Sir:

I have the honour to submit herewith the Annual Report of the Alberta Power Commission for the calendar year ended December 31, 1970.

An audited statement of receipts and disbursements of the Alberta Power Commission will be sent under separate cover.

Respectfully submitted,

ALBERTA POWER COMMISSION

H. P. Cameron
Acting Chairman

ALBERTA POWER COMMISSION

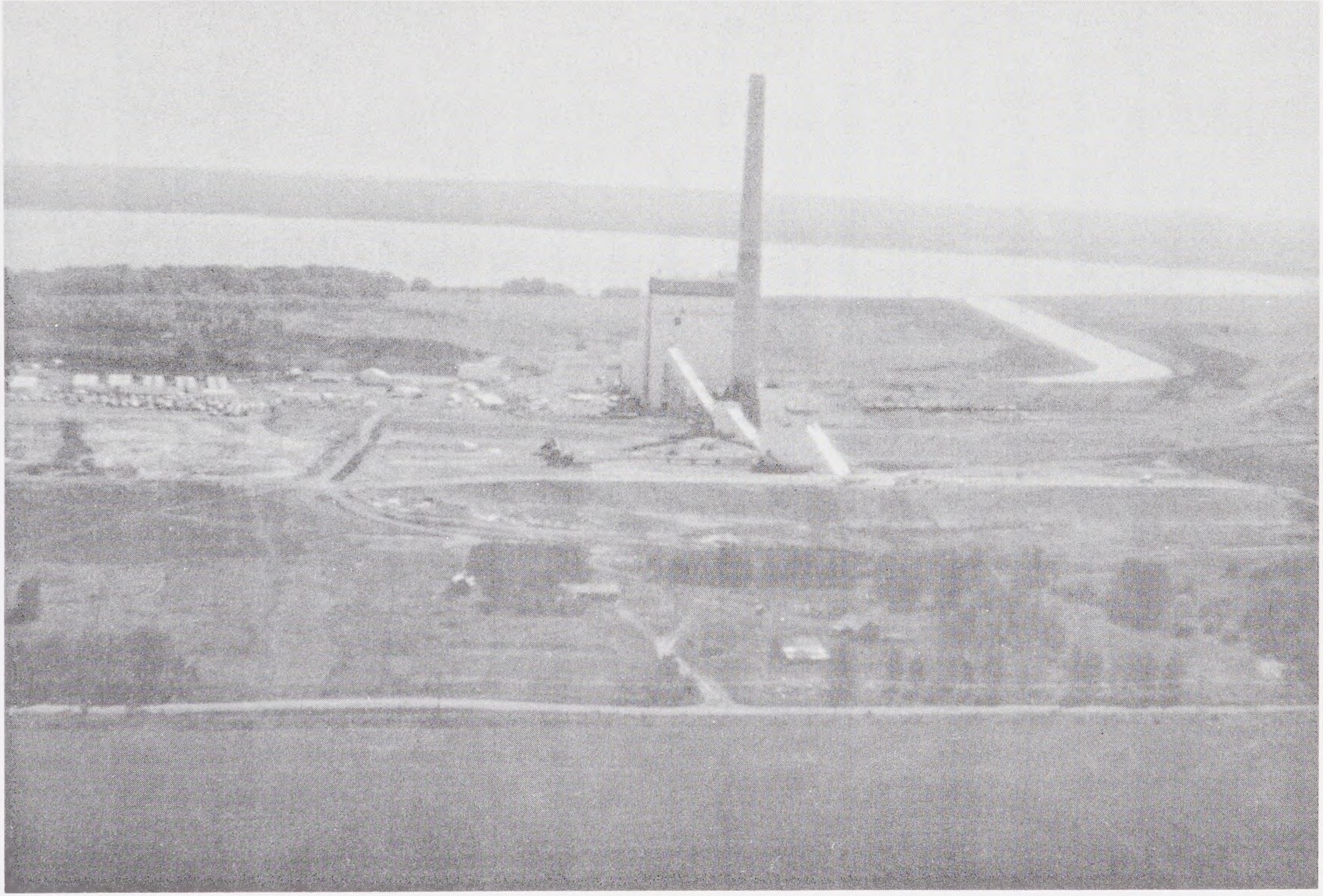
1970

* * * * * * * * * * * * * * * *

H. P. Cameron	Acting Chairman
W. C. Whittaker	Member
R. W. Losie	Member
J. L. Reid	Member & Secretary

* * * * * * * * * * * * * * * *

Mr. J. G. MacGregor retired as Chairman in May, 1970.



THE SUNDANCE THERMAL PLANT WHICH BEGAN SUPPLYING 286 MW TO CALGARY POWER'S GRID ON OCTOBER 27, 1970.

PREFACE

The Alberta Power Commission's duties, as set out under the Power Commission Act, are of a regulatory and supervisory nature. The Commission does not own or operate any power plants, transmission lines or distribution systems. In this respect it is different from the Power Commissions in all the other provinces except Prince Edward Island and Newfoundland. Many of its duties are covered by Section 6 of the Power Commission Act, which is as follows:-

"Whenever required so to do by the Lieutenant Governor in Council, the Commission shall inquire into, examine and investigate -

(a) water powers and water privileges in Alberta, their value and capacity;

(b) the existing facilities for the manufacture and distribution of power in Alberta;

(c) such other matters relating to power and its distribution in Alberta as the Lieutenant Governor in Council from time to time may require; and shall report thereon to the Lieutenant Governor in Council."

The Commission feels that, at the present time, its principal duties are threefold:

1. The collection of statistics of the Electric Utility Industry in the Province, and the study of these statistics, so that the people of the Province will have a true picture of the industry.
2. The study of hydro-electric sites and other power possibilities

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in the Province. The Commission also has been engaged in a study of the existing network of transmission lines in the Province with particular reference to more extensive interconnection which will ensure the most efficient use of the large generating units which are already in operation and of those anticipated in the future.

3. Farm Electrification - This is a phase of its work to which the Commission devotes much of its time. While the main network of farm electrification lines is completed, problems of operating the farm lines, many of which are now over twenty years old, are taking much more time. The Commission is constantly engaged in studying new operating problems as they come up.

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ALBERTA POWER COMMISSION
ANNUAL REPORT
For Year Ending December 31, 1970

The statistics compiled for this report show continued increase in the generation and use of electricity in Alberta. This is reflected in the increase of 17% in the power generated in the province. On the basis of our growing population, which is now estimated at 1,600,000, this indicates a K.W.H. generated per capita of 5839, which increased from 5222 K.W.H. a year ago. Ten years ago this per capita figure was 2436.

Producing and distributing this greatly increased output of electricity has entailed not only the continued expansion of power plants but has also necessitated a marked expansion in the mileage of the network of high voltage transmission and interconnecting lines.

The increase in use of electricity in Alberta during the year 1970 is indicated by the following short summary. The figures compiled in it and throughout this report are confined to the Electric Utility Industry and are comparable to those presented by the Dominion Bureau of Statistics under the category of "Utilities".

The increase in K.W.H. generated over that of the previous year was 17%. Steam, gas, turbine and internal combustion generated 87% of the K.W.H. produced, leaving 13% of the generation from hydro plants. The internal combustion output, of course, is mainly generated by Northland Utilities Ltd. and Canadian Utilities Ltd. in the Peace River country and includes the power generated by gas turbines at Valleyview, Simonette and Rainbow.

In this report we have changed our method of reporting transmission lines to show only lines with voltages of 33 KV or higher. The lower voltage lines are included in figures for distribution lines. Thus, we can only compare total circuit mileage of power lines with last year's figure which shows an increase in 1970 of 347 miles to 74,048 miles.

The figures in Tables 1 to 5 inclusive, and in Tables 8 and 9 which follow, are comparisons with the other Prairie Provinces and with Canada as a whole. Except for those marked with an asterisk (*), the figures used are those obtained from the Dominion Bureau of Statistics.

Table No. 1 shows the capacity in M.W. net of the Utility Electric Stations in Canada for the past several years.

TABLE NO. 1

Capacity of Utility Electric Stations

M.W. Net

Year	Alberta*	Canada	Saskatchewan	Manitoba
1959	750	16,937	670	757
1960	917	18,419	737	1,024
1961	947	19,492	754	1,063
1962	1,092	20,383	751	1,065
1963	1,137	21,200	836	1,068
1964	1,178	21,891	922	1,060
1965	1,326	24,157	922	1,387
1966	1,609	25,755	962	1,391
1967	1,895	27,521	1,033	1,407
1968	1,895 (1)	30,599	1,208	1,530
1969	2,043 (1)	34,325	1,358	1,565
1970	2,513 (1)			

Increase during the 10-year period ended 1969

	Alberta	Canada	Saskatchewan	Manitoba
1959-1969 Increase:	1,293	17,388	688	808
Per Cent Increase:	172%	103%	103%	107%

Increase
Alberta: 1960-1970 = 174%

* Figures for Alberta compiled by Alberta Power Commission. All other figures are D.B.S.

(1) 1968 to 1970 figures for Alberta are "Net Capability", all other figures are "Capacity".

Table No. 2 shows the growth of K.W.H. generated net during the past several years.

TABLE NO. 2

Electric Energy Generated Net by Utilities

(Millions of K.W.H.)

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	2,830	83,049	1,998	3,598
1960	3,126	89,077	2,103	3,690
1961	3,451	89,389	2,422	3,786
1962	3,767	92,096	2,594	4,305
1963	4,141	93,501	2,875	4,785
1964	4,645	102,880	3,202	4,915
1965	5,187	110,798	3,548	5,417
1966	5,739	125,998	3,752	6,102
1967	6,284	133,301	4,151	6,499
1968	7,119	143,833	4,660	6,706
1969	8,206	157,461	5,298	7,297
1970	* 9,332			

Increase during the 10-year period ended 1969

Year	Alberta	Canada	Saskatchewan	Manitoba
1959-1969 Increase:	5,376	74,412	3,300	3,699
Per Cent Increase:	190%	90%	165%	103%

Increase
Alberta: 1960 - 1970 = 199%

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* 1970 figures for Alberta compiled by Alberta Power Commission. All other figures are D.B.S.

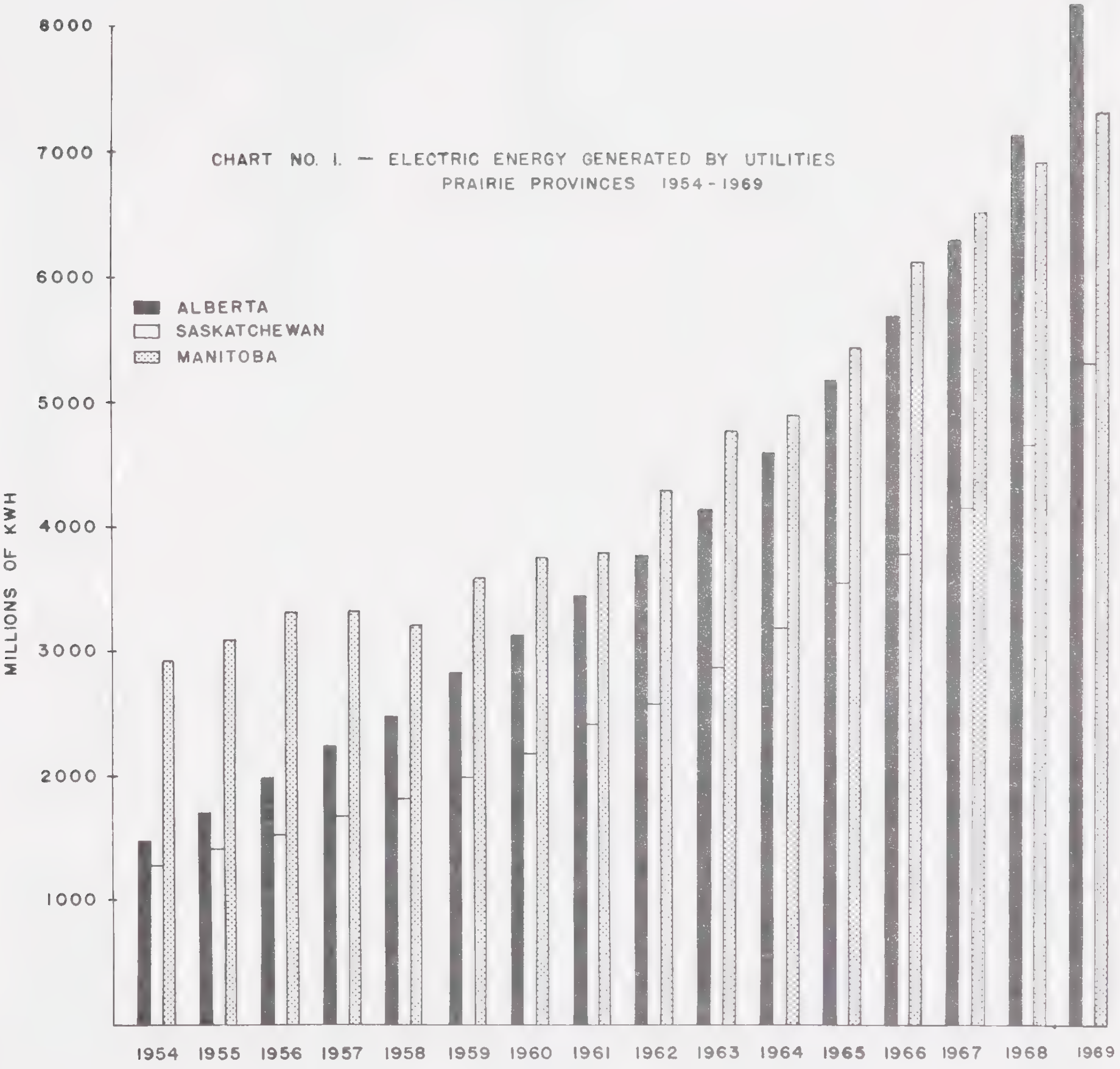


CHART NO. 1 - ELECTRIC ENERGY GENERATED BY UTILITIES
PRAIRIE PROVINCES 1954 - 1969.

TABLE NO. 3

Annual K.W.H. used per Domestic and Farm Customer

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	2,859	4,338	2,974	5,993
1960	2,989	4,490	3,019	6,184
1961	3,224	4,660	3,112	6,535
1962	3,417	4,870	3,440	6,468
1963	3,595	5,084	3,688	6,630
1964	3,813	5,307	3,918	7,237
1965	4,193	5,630	4,397	7,582
1966	4,430	5,911	4,673	7,637
1967	4,591	6,261	4,943	7,837
1968	4,859	6,571	5,115	8,062
1969	5,265	6,834	5,629	8,374

These are all D.B.S. Figures.

TABLE NO. 4

Costs in Cents per K.W.H. Domestic and Farm Customers

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	2.28	1.61	3.01	1.15
1960	2.22	1.60	2.98	1.16
1961	2.17	1.58	2.93	1.15
1962	2.15	1.54	2.83	1.14
1963	2.05	1.52	2.76	1.16
1964	1.99	1.47	2.59	1.17
1965	1.92	1.43	2.35	1.15
1966	1.87	1.41	2.27	1.18
1967	1.84	1.45	2.22	1.17
1968	1.79	1.48	2.18	1.26
1969	1.75	1.75	2.10	1.36

These are all D.B.S. Figures

TABLE NO. 5

Total Number of Customers of Utilities

(thousands)

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	339	5,009	241	282
1960	355	5,178	256	287
1961	368	5,366	265	300
1962	384	5,531	271	304
1963	396	5,647	276	297
1964	408	5,844	286	313
1965	420	5,981	292	303
1966	428	6,147	300	310
1967	439	6,321	307	313
1968	459	6,506	317	317
1969	477	6,702	316	322
1970	* 496			

Increase during the 10-year period ending 1969

	Alberta	Canada	Saskatchewan	Manitoba
1959-1969 Increase:	138	1,693	75	40
Per cent Increase:	41%	34%	31%	14%

Increase Alberta: 1960 to 1970 = 40%

* 1970 figures for Alberta compiled by Alberta Power Commission. All other figures are D.B.S.

TABLE NO. 6

TOTAL CIRCUIT LINE MILEAGE IN ALBERTA

(Includes transmission, distribution and farm lines)

Year	Transmission	Distribution	R.E.A. Lines	Company-owned Farm Line	Total Lines
1960	10,096	5,034	36,661	3,030	54,821
1961	10,677	5,309	38,058	3,069	57,113
1962	11,491	5,807	39,393	3,086	59,777
1963	12,193	5,819	40,570	3,118	61,700
1964	13,152	6,079	41,652	3,100	63,983
1965	13,839	6,346	42,710	3,137	66,032
1966	14,549	6,628	43,706	3,140	68,023
1967	15,807	6,852	44,279	3,263	70,201
1968	17,217	7,177	44,705	3,050	72,149
1969	18,041	7,488	45,142	3,030	73,701
1970	7,296 *	19,634 *	44,061	3,057	74,048

R.E.A. owned lines
Increase 1960-1970 = 20.2%

Total circuit line Mileage
Increase 1960-1970 = 35.1%

* All lines up to 22,000 volts re-classified as distribution lines in 1970.

All figures compiled by the Alberta Power Commission

TABLE NO. 7

K.W.H. GENERATED PER CAPITA IN ALBERTA

Year	Population	KWH Generated x 10^6	KWH Generated/ Capita
1960	1,283,000	3,126	2,436
1961	1,332,000	3,446	2,587
1962	1,370,000	3,768	2,750
1963	1,405,000	4,186	2,979
1964	1,432,000	4,596	3,209
1965	1,451,000	5,138	3,541
1966	1,463,000	5,689	3,889
1967	1,490,000	6,235	4,185
1968	1,526,000	7,066	4,631
1969	1,561,000	8,152	5,222
1970	1,600,000	9,332	5,833

TABLE NO. 8

Number of Farms Served by Utilities

As At December 31 Each Year

Year	Alberta	Saskatchewan	Manitoba
1959	46,258	55,424	39,027
1960	49,757	59,384	39,162
1961	52,316	62,260	39,326
1962	54,689	59,684	39,489
1963	57,034	61,084	39,639
1964	58,604	62,436	39,589
1965	60,064	62,260	39,452
1966	59,431	65,531	39,594
1967	60,863	67,147	39,579
1968	61,039	67,874	39,359
1969	63,483	65,991	39,288
1970	* 63,485		

* 1970 figure for Alberta compiled by Alberta Power Commission and is not comparable because it includes only services actually in use. All other figures are D.B.S.

TABLE NO. 9

Consumption in K.W.H. per Farm Per Year

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	3,956	4,086	3,180	5,366
1960	4,029	4,345	3,315	5,523
1961	4,404	4,654	3,537	5,995
1962	4,804	5,204	4,198	6,637
1963	4,905	5,985	4,581	7,234
1964	5,370	6,361	5,059	7,921
1965	6,051	7,045	6,065	9,098
1966	6,594	7,720	6,268	9,578
1967	7,128	8,548	6,813	10,504
1968	7,557	9,155	7,095	11,246
1969	8,133	10,095	8,258	12,461
1970	* 8,427			

* 1970 figure for Alberta compiled by Alberta Power Commission. All other figures are D.B.S.

PRESENT STATUS OF THE INDUSTRY

The statistics for the Electric Utilities for the year 1970 follow. Some of the minor figures are estimates only, due to the fact that the report has to be prepared before the various utilities have completed their statistics for the past year. These minor estimates will not be in error by more than 1% and 2%, so that the error on the whole will be negligible.

Tables 10 to 16 deal with plant capability, peak load and K.W.H. generated. They break up the figures to show what was generated by hydro, steam and internal combustion engines, and also to show the proportions generated by the publicly-owned and privately-owned plants. Even though the Peace River country is now tied into the provincial grid by two 138 K.V. transmission lines, it is desirable to keep a separate set of figures for its generation, consumption, etc. As a result, these figures are collected in Tables 16 to 20 as a Peace River sub-total.

In 1970, the interconnected system shown in Group A in the tables had a combined capability of 2,495,000 K.W., and generated 9,292,625,000 K.W.H. It served 493,012 customers. This system accounts for over 99% of the generating capacity of the province, and of the K.W.H. generated and number of customers served.

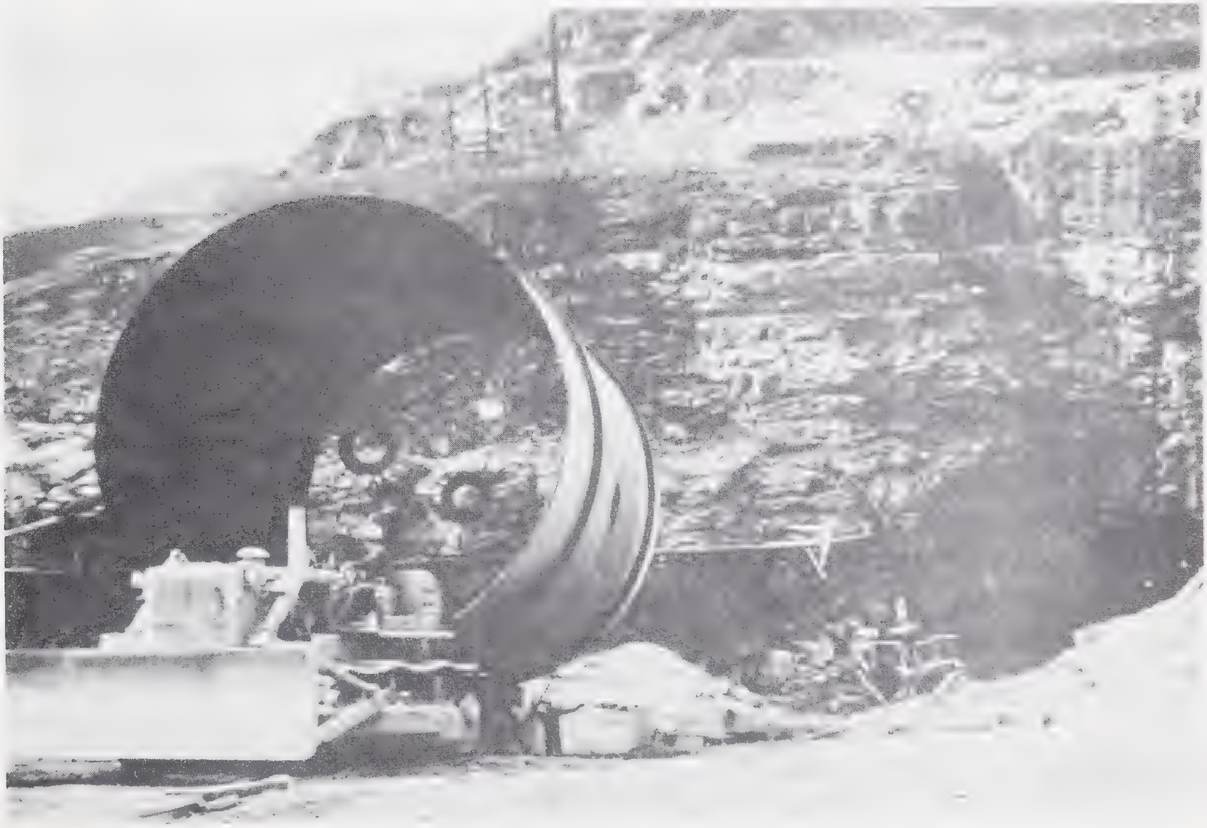
The Peace River Country interconnected system shown as a sub-total under Group A had a combined capability of 102,500 K.W., generated 303,256,000 K.W.H. and served 25,320 customers.

The hydro plants of Calgary Power Ltd. are rated as follows:-

TABLE NO. 10

1970 rating of Calgary Power Ltd. hydro plants:

Plant	Gross H.P.	Net Capability K.W.
Pocaterra	18,500	14,900
Interlakes	6,900	5,000
Rundle	63,000	49,900
Spray	124,000	102,800
Three Sisters	3,600	3,000
Cascade	46,000	35,900
Horseshoe	20,000	13,900
Kananaskis	24,000	18,900
Barrier	16,000	12,900
Ghost	67,450	50,900
Bearspaw	22,000	16,900
Brazeau	450,000	355,000
	861,450	680,000



THE LAST SECTION OF STEEL LINER BEING INSERTED INTO THE DIVERSION TUNNEL AT CALGARY POWER'S BIGHORN POWER AND STORAGE DEVELOPMENT.

TABLE NO. 11

1970 rating of major thermal plants.

Plant	Fuel	Net Capability K.W.
Calgary Power Ltd.		
Wabamun	Gas	68,000
Wabamun	Coal	501,000
Sundance	Coal	286,000
Canadian Utilities Ltd. and Northland Utilities Ltd.		
Battle River	Coal	212,000
Drumheller	Coal	15,000
* Sturgeon	Gas	18,500
* Simonette	Gas	19,000
* Rainbow	Gas	58,000
Fort McMurray	Oil and Gas	10,050
* City of Edmonton		
Rossdale	Gas	392,000
Clover Bar	Gas	159,000
* City of Lethbridge	Gas	30,700
City of Medicine Hat	Gas	40,500

* Includes Gas Turbines

Chart No. 2 on Page 13 shows the power generated in the province year by year broken down by the sources of energy used. In so doing, it points up the rapid increase in importance of thermal generation and particularly of coal-fired steam plants.

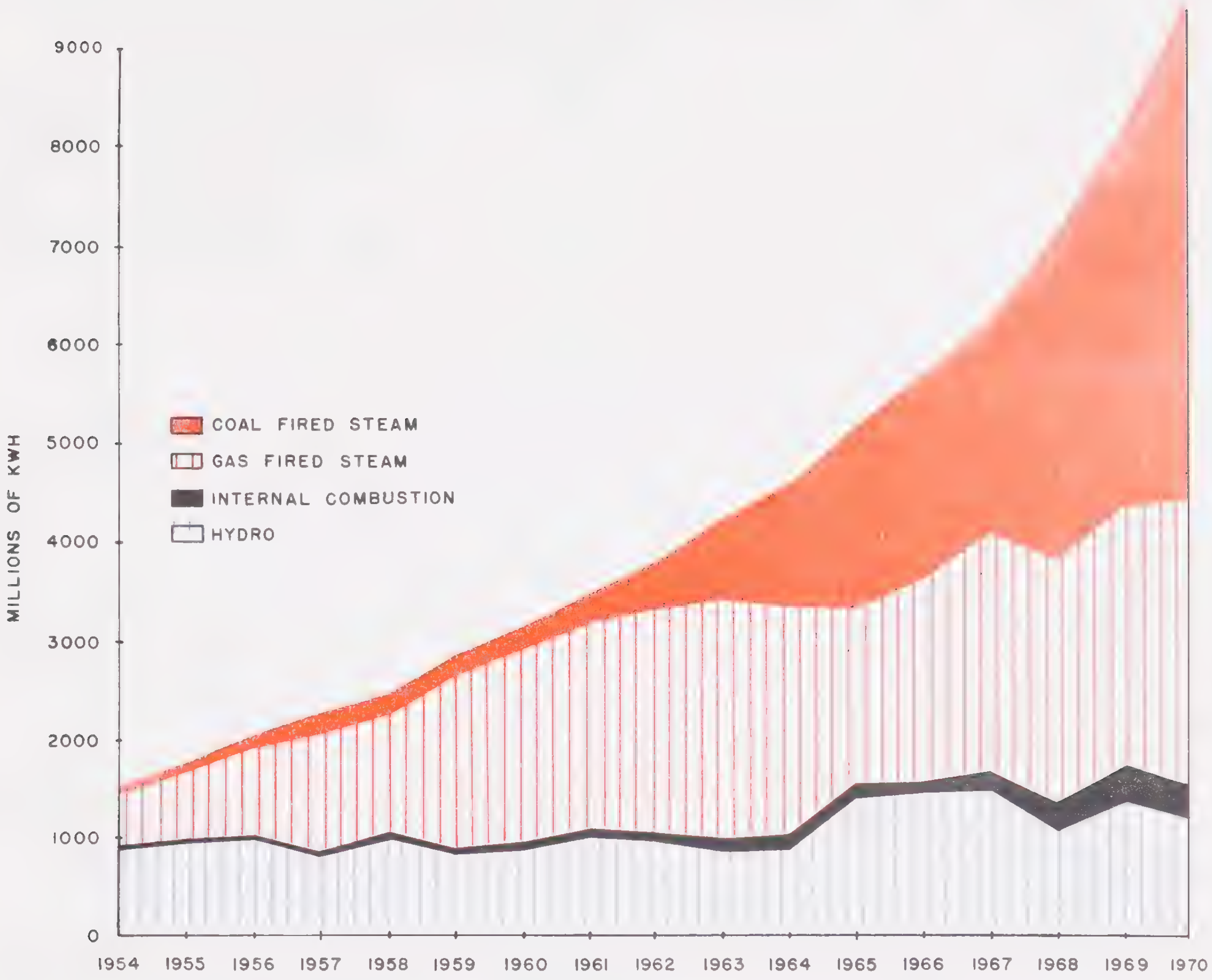


CHART NO. 2 - ELECTRIC ENERGY GENERATED IN
ALBERTA 1954 - 1970 BY SOURCES OF ENERGY

TABLE NO. 12

The following Companies or Municipalities provide Central Station Electrical Service in the province. This table gives preliminary data as to their plant capabilities at the end of 1970. It also gives the peak loads on their plants and the M.W.H. they generated (net) during 1970.

PRIVATELY OWNED

Name of Company	Net Capability K.W.	Net Peak Load K.W.	Net Generation M.W.H.	
Calgary Power Ltd.	1,535,000	1,190,700	5,559,244	(1)
Canadian Utilities Ltd. & Northland Utilities Ltd.	356,260	315,560	1,405,639	
	1,891,260		6,964,883	

PUBLICLY OWNED

Name of Municipality	Net Capability K.W.	Net Peak Load K.W.	Net Generation M.W.H.	
City of Edmonton	551,000	469,500	1,947,318	
City of Lethbridge	30,700	30,400	123,017	
City of Medicine Hat	40,500	39,900	296,696	(2)
	622,200		2,367,031	
Total	2,513,460		9,331,914	

(1) Includes 155,999,700 K.W.H. supplied to B.C. Hydro.

(2) Includes 140,600,800 K.W.H. supplied to system.

TABLE NO. 13

The following is a rearrangement of the figures in Table 12, so as to break them down into power generated by hydro, steam and internal combustion plants during 1970. Some of the thermal plants include gas turbines.

Name of Company	Net Capability K.W.	Net Peak Load K.W.	Net Generation M.W.H.	
HYDRO				
Calgary Power Ltd.	680,000	586,700	1,211,299	(1)
Northland Utilities Ltd.	1,400	530	5,301	
Total Hydro:	681,400		1,216,600	
STEAM				
Calgary Power Ltd.	855,000	819,700	4,347,945	(1)
Canadian Utilities Ltd.	235,000	216,300	1,063,094	
City of Edmonton	551,000 *	469,500	1,947,318	
City of Lethbridge	30,700 *	30,400	123,017	
City of Medicine Hat	40,500	39,900	296,696	(2)
Total Steam:	1,712,200		7,778,070	
INTERNAL COMBUSTION				
Canadian Utilities Ltd. & Northland Utilities Ltd.	119,860 *	98,730	337,244	
Total Internal Combustion:	119,860		337,244	
GRAND TOTAL:	2,513,460		9,331,914	

* Includes gas turbines.

(1) Includes 155,999,700 K.W.H. supplied to B.C. Hydro.

(2) Includes 140,600,660 K.W.H. supplied to system.

TABLE NO. 14

The following table may be of interest as showing the relative percentages of capacity and generation in 1970, as set out in the foregoing tables.

Method of Generation	% of Capability	% of Power Generated
Hydro	27.1	13.0
Steam & Gas Turbine	68.1	83.4
Internal Combustion	4.8	3.6
	100.0	100.0
Publicly owned	24.8	25.4
Privately owned	75.2	74.6
	100.0	100.0

TABLE NO. 15

The following is a breakdown of the fuel used in larger thermal plants during 1970.

	Gas M.C.F.	Oil Gallons	Coal Tons
Calgary Power Ltd.			
Wabamun	6,543,056	-	2,416,527
Sundance	148,981	-	97,096
Canadian Utilities Ltd. & Northland Utilities Ltd.			
Drumheller	-	-	18,843
Battle River	-	-	726,624
Valleyview	1,667,043	-	-
Simonette	1,317,575	-	-
Rainbow	-	11,277,008	-
Fairview	171,243	-	-
Miscellaneous	342,975	543,722	-
City of Edmonton			
Rossdale	21,942,953	2,560,010	-
Clover Bar	2,156,327	-	-
City of Lethbridge	2,533,039	-	-
City of Medicine Hat	5,074,423	-	-
	39,364,576	14,380,740	3,259,090

TABLE NO. 16

SUMMARY OF GENERATING PLANTS IN ALBERTA

As at December 31, 1970

	Hydro		Steam		Internal Combustion	
	Net Capability K.W.	Net Generation 1970 M.W.H.	Net Capability K.W.	Net Generation 1970 M.W.H.	Net Capability K.W.	Net Generation 1970 M.W.H.
A. WITHIN THE INTERCONNECTED SYSTEM						
(1) Southern Area						
Calgary Power Ltd.	680,000	1,211,299	855,000	4,347,945	-	-
Canadian Utilities Ltd.			235,000	1,063,094		
City of Edmonton *			551,000	1,947,318		
City of Lethbridge			30,700	123,017		
City of Medicine Hat			40,500	296,696		
Sub-total	680,000	1,211,299	1,712,200	7,778,070	-	-
(2) Peace River Area						
Canadian Utilities Ltd. and Northland Utilities Ltd. *					102,500	303,256
Peace River Sub-total					102,500	303,256
TOTAL GROUP A INTERCONNECTED SYSTEM	680,000	1,211,299	1,712,200	7,778,070	102,500	303,256
B. ISOLATED SYSTEMS						
Canadian Utilities Ltd.						
McMurray					10,050	19,586
Miscellaneous Small Plants					1,095	2,452
Northland Utilities Ltd.						
Jasper	1,400	5,301			4,525	10,092
Miscellaneous Small Plants					1,690	1,858
TOTAL GROUP B ISOLATED SYSTEMS	1,400	5,301			17,360	33,988
[illegible] TOTALS	681,400	1,216,600	1,712,200	7,778,070	119,860	337,244
GRAND TOTALS FOR PROVINCE			2,513,460	9,331,914		

* Includes gas turbines.

TABLE NO. 17

Total Circuit Miles of transmission lines in the Province by regional groups as at December 31, 1970. This does not include company-owned or co-operative-owned farm lines.

	VOLTAGE 33,000 to 72,000	 132,000 & greater	 Total
A. WITHIN THE INTERCONNECTED SYSTEM			
(1) Southern Area			
Calgary Power Ltd.	1,628	2,572	4,200
Canadian Utilities Ltd.	979	360	1,339
City of Medicine Hat	-	-	-
Sub-total:	2,607	2,932	5,539
(2) Peace River Area			
Canadian Utilities Ltd.	471	394	865
Northland Utilities Ltd.	240	652	892
Peace River Sub-total:	711	1,046	1,757
Total Group A - Interconnected System	3,318	3,978	7,296
B. ISOLATED SYSTEMS			
Canadian Utilities Ltd.			
McMurray	-	-	-
Northland Utilities Ltd.			
Jasper	-	-	-
Total Group B - Isolated Systems	-	-	-
COMBINED TOTALS:	3,318	3,978	7,296

TABLE NO. 18

SUMMARY OF DISTRIBUTION SYSTEMS IN ALBERTA
As at December 31, 1970

	Total Number of Customers Served (Includes Farms)	MWH Sold, less Sales to other Companies (Includes Farms)	Circuit Miles Of Line (Excludes Farms)
A. WITHIN THE INTERCONNECTED SYSTEM			
(1) Southern Area			
Calgary Power Ltd.	140,000 (est.)	2,973,870	11,158
Canadian Utilities Ltd.	39,877	413,851	2,473
City of Edmonton	128,050	1,759,483	1,197
City of Calgary	123,700	1,776,883	1,089
City of Lethbridge	12,979	148,000	158
City of Medicine Hat	9,782	148,808	222
City of Red Deer	8,300	101,905	167
Town of Ponoka	1,691	13,747	28
Town of Cardston	1,013	6,093	35
Town of Ft. Macleod	1,026	7,386	30
Town of Blairmore	550	3,050 (est.)	6
Town of Coleman	537	2,208	5
Village of Cowley	65 (est.)	477 (est.)	2
Village of Frank	64 (est.)	400 (est.)	2
Village of Lundbreck	58 (est.)	300 (est.)	2
Southern Area Sub-total	467,692	7,356,461	16,574
(2) Peace River Area			
Canadian Utilities Ltd.	13,414	320,944	1,283
Northland Utilities Ltd.	11,906	248,819	1,599
Peace River Area Sub-total	25,320	569,763	2,882
TOTAL GROUP A INTERCONNECTED SYSTEM	493,012	7,926,224	19,456
B. ISOLATED SYSTEMS			
Canadian Utilities Ltd.			
McMurray	1,819	18,044	81
Misc. Small Plants	259	1,578	6
Northland Utilities Ltd.			
Jasper	977	14,074	86
Misc. Small Plants	246	1,139	5
TOTAL GROUP B ISOLATED SYSTEMS	3,301	34,835	178
COMBINED TOTALS	496,313	7,961,059	19,634

TABLE NO. 19

SUMMARY OF RURAL ELECTRIFICATION SYSTEMS IN ALBERTA AS AT DECEMBER 31, 1970

	Farm Services With Power In Use	Non-Farms Served By Farm Lines	Total Services In Use On Farm Lines	Circuit Miles Of Farm Line
INTERCONNECTED SYSTEM - SOUTHERN AREA				
Calgary Power Ltd.				
Experimental Areas and Individual Rurals	3,784	917	4,701	2,417 *
R.E.A.'s	40,777	8,909	49,686	27,609
Canadian Utilities Ltd.				
Experimental Areas and Individual Rurals	684	144	828	405 *
R.E.A.'s	11,744	1,176	12,920	11,020
Lundbreck Light & Power Co-op	32	53	85	33
Adjacent to Cities, etc.	121	-	121	56 *
Southern Area Sub-total	57,142	11,199	68,341	41,540
INTERCONNECTED SYSTEM - PEACE RIVER AREA				
Canadian Utilities Ltd.				
Experimental Areas and Individual Rurals	125	130	255	76 *
R.E.A.'s	3,001	220	3,221	2,686
Northland Utilities Ltd.				
Experimental Areas and Individual Rurals	154	8	162	103 *
R.E.A.'s	3,063	296	3,359	2,713
Peace River Area Sub-total	6,343	654	6,997	5,578
TOTAL	63,485	11,853	75,338	47,118

* The lines to serve these farms are the property of the Power Companies.

TABLE NO. 20

DATA BY REGIONAL GROUPS
As At December 31, 1970

	GROUP A INTERCONNECTED SYSTEM			GROUP B ISOLATED SYSTEM	COMBINED TOTALS
	South Area	Peace River Area	Sub-total		
PLANTS					
K.W. Capability	2,392,200	102,500	2,494,700	18,760	2,513,460
M.W.H. Generated	8,999,651	303,256	9,292,625	39,289	9,331,914
TRANSMISSION					
Miles of Line	5,539	1,757	7,296	-	7,296
DISTRIBUTION					
Number of Customers	467,692	25,320	493,012	3,301	496,313
M.W.H. Sold	7,356,461	569,763	7,926,224	34,835	7,961,059
Miles of Line	16,574	2,882	19,456	178	19,634
RURAL					
Number of Farms (1)	57,142	6,343	63,485	-	63,485
Number of non-farms (1)	11,199	654	11,853	-	11,853
Miles of Company owned farm line (2)	2,878	179	3,057	-	3,057
Miles of R.E.A. Line (2)	38,662	5,399	44,061	-	44,061
Total farm lines	41,540	5,578	47,118	-	47,118

(1) Included in number of customers shown under Distribution.

(2) Not included in miles of line shown under Distribution or Transmission Lines.

DETAILS OF PLANT AND SYSTEM CHANGES DURING 1970

The following is a summary of the changes to generating capacity, transmission line facilities, etc., during 1970 as submitted by the power companies concerned.

CALGARY POWER LTD.

(1) Plant Capacity

Construction is being completed on the first stage of the Sundance plant on the south side of Lake Wabamun. This is a 286,000 KW (net) coal-burning unit and was in operation in 1970.

Work is underway on the Bighorn Storage and Power Development project, situated on the North Saskatchewan River, 80 miles west of Rocky Mountain House. The river diversion was accomplished in October, 1970. The capacity of the Bighorn hydro plant will be 108,000 KW.

(2) Transmission Lines

During 1970, the main transmission lines have been increased as follows:

240 KV

Two aluminum tower lines were completed to tie Sundance plant into the system, each six miles in length. Thirty-seven miles of steel towers from Stavely to Peigan were built.

138 KV

A total of 80 miles of new 138 KV line was built, serving the following areas:-

- 5 miles to tie 2 existing 138 KV lines together in the Ponoka area.
- 16 miles from Whitecourt to Clarke Lake.
- 58 miles from Clyde to Flatbush.
- 1 mile to Gulf Refinery, Edmonton.

69 KV

Sixty-one miles of 69 KV were constructed:-

- 47 miles from Benalto to Strachan.
- 6 miles to tie Rocky Mountain House into Benalto, Strachan line.
- 4 miles from Black Diamond to Hartell.
- 4 miles to tie Easyford sub into existing lines.

25 KV

A total of 72 miles of new 25 KV line was built serving the following areas:-

- 17 miles from Cochrane to Bragg Creek.
- 13 miles in the Onoway area.
- 21 miles from Black Diamond to Quirk Creek and alternate feed.
- 10 miles to serve Banff Oil Ram River gas plant.
- 11 miles to CFAC transmitter, Calgary.

(3) New Substations

The following new substations have been completed in 1970.

Peigan	160 MVA 240/138 KV substation.
Gulf Oil, Edmonton	15/20 MVA 138/13.8 KV substation.
Kaybob	9 MVA 138/4.16 KV substation for Chevron Gas Plant.
Fox Creek	138 KV switching station.
Strachan	5 MVA 69/25 KV substation.
Flatbush	10 MVA 138/23/4.16 KV substation for Rainbow Pipeline Pump Station.
Onoway	6 MVA 69/23 KV substation.
Sundance	5 MVA 59/23.9 KV substation; 250/333 MVA 240/17.5 KV substation including 40 MVA 240/72 KV transformer.
Boyle	1 MVA 69/2.4 KV for Great Canadian Oil Sands.
Easyford (West of Drayton Valley)	10 MVA 69/23 KV substation.

Hartell	3 MVA 69/4.16 KV substation for Hudson's Bay Oil & Gas.
Mobile Station	10 MVA, trailer mounted, multi-voltage substation, was purchased.

Extensions to Main Substations

Metiskow	10 MVA 138/23 KV substation.
Janet	Add 240 KV airblast circuit breaker for line to Peigan.
North Calder	Add 1-20 MVA 138/24.9 KV transformer, 1-15 MVA 132/72 KV autotransformer, 1-69 KV OCB and 4-23 KV OCB's.
Irricana	Increase voltage regulator capacity from 3.75 MVA to 10 MVA.
Harmattan	Increase 138/24.9 KV transformer capacity from 7.5 MVA to 15 MVA.
Edmonton	Add 25 MVA 138/23 KV transformer and 1-23 KV breaker and remove 50 MVA 138/72 KV transformer.
Black Diamond	Increase 69/24.9 KV transformer capacity from 2.5 MVA to 6 MVA. Increase voltage regulator capacity from 2.5 MVA to 10 MVA - add 1-23 KV OCB.
Clyde	Add 138 KV breaker for line to Flatbush.
Lodgepole	Add 20 MVA 138/23 KV transformer and remove 10 MVA 69/23 KV transformer. Increase voltage regulator capacity from 10 MVA to 20 MVA.
Gainford	Increase 69/2.4 KV transformer capacity from 3 MVA to 5 MVA.
South Calder	Dismantle and salvage 138/69/23 KV substation.
Natal	Add 50 MVA 138/69 KV transformer.
Rockyford	Add 5 MVA 23.9 KV voltage regulator.
Highridge	Add 5 MVA 2.4 KV voltage regulator.
Mayerthorpe	Increase 69/24.9 KV transformer capacity from 2.5 MVA to 6 MVA.

Redwater	Increase voltage regulator capacity from 5 MVA to 10 MVA.
Eckville	Add 2.5 MVA 69/23.9 KV transformer.

4. Services

New Communities

The hamlets of Wizard Lake, Rosewood Beach and Standoff were provided with service during 1970.

Street Lights

Approximately 721 mercury vapor street lights were added to the Calgary Power system during 1970. Included in this figure is the replacement of some 50 radial wave units of the incandescent type.

Oilfields

Additional oilfield service load of 14,000 HP was connected to the system in 1970. This included oilwell pumps, gas well pumps, gathering systems, water pump and injection systems and other miscellaneous services. Due to the utilization and termination of other oilfield services, the net increase amounted to 9,000 HP.

The Pembina field was the most active area during the past year. There is now a total of approximately 94,000 HP connected to oilfield services in Calgary Power's service area.

Industrial and Power Services

Large, new and expanded industrial installations added some 22,000 KW of load to the system in 1970, with an additional 39,000 KW commited for the near future.

CANADIAN UTILITIES LTD.

(1) Plant Capacity

Plant Name	Capacity Removed	Capacity Added	Year End Capacity
Fort Chipewyan	150 KW	250 KW	750 KW
Fort McKay	15 KW	80 KW	105 KW
Janvier	-	150 KW	150 KW
Grande Prairie Microwave	10 KW	-	50 KW
Nipisi Oilfield	1,000 KW		-
Rainbow		30,000 KW	60,000 KW

(2) Transmission Lines

Grande Prairie - Gold Creek	25 KV	24.2 miles
Mitsue-Nipisi	144 KV	56.7 miles
Sturgeon - Little Smoky River	144 KV	15.5 miles
Fox Creek - Fox Creek Hudson's Bay Oil & Gas Plant	25 KV	5 miles
Swan River - Kinuso	72 KV	31.5 miles
Crystal Lake (Grande Prairie) - Hwy. 34	72 KV	6 miles
Kinuso - House Mountain	25 KV to 72 KV	16.5 miles
Sarah Lake - Swan Hills	25 KV	10.2 miles
Nipisi Oilfield	25 KV	6.9 miles
Rowley - Drumheller	72 KV	21.8 miles

(3) Substations

	Capacity Removed	Capacity Added	KV
Goose River	450 KVA	1500 KVA	72-25
Simonette Plant		16,000	144-72
Mannix Mine	3-200 KVA	3-500 KVA	72-4.16
Nipisi		7,000 KVA	144-25-4.16

NORTHLAND UTILITIES LTD.

Plant Name	Capacity Removed	Capacity Added	Year End Capacity
Wabasca	250 KW	500 KW	800 KW
Hay River	600 KW	500 KW	3,350 KW
Fort Providence		150 KW	555 KW
Atikameg	40 KW		175 KW
Jean D'or Prairie			80 KW
Jasper		600 KW	4,525 KW

NORTHLAND UTILITIES LTD. (cont'd)

(2) Transmission Lines

Fort Vermilion - Sawmill	25 KV	8.7 miles
Nipisi - Peace River	144 KV	98.8 miles
Keg River Post	25 KV	2 miles

(3) Substations

	Capacity Removed	Capacity Added	KV
Basset		7500 KVA	144-25-4.16
Cadotte River	3,000 KVA	7500 KVA	144-25-4.16
Rainbow		24000 KVA	144-25-14.4
Kemp River		7500 KVA	144-25-4.16 KV

CITY OF EDMONTON

During 1970 the City of Edmonton commissioned the first unit of 159 M.W. capability in the Clover Bar generating station.

CONSTRUCTION OF TURBINE GENERATOR FOUNDATION
H.R. MILNER GENERATING STATION GRANDE CACHE

FORECAST

Table 21 shows the growth which we believe will take place in the electrical load of the province from now until 1975. It shows the actual capability in M.W. of the power plants as at December 31, 1970, the peak load that occurred and the minimum capability required. In a large power system it is always necessary to have reserve capacity in case one or more units fail. Current practice on this continent is to maintain a reserve of whatever is the greater of:- (1) the largest unit or (2) 12% of the estimated peak load.

On this basis, we have shown a column which we have called Minimum Capability Required. Since in 1970, for instance, the largest unit in the province was rated at 286 MW, the minimum capability required had to be large enough that if this unit went out of service we would still have a capability equal to or greater than 1,843 MW, which was the peak load. As will be seen from the table, we had a capability of 2,495 so that if the 286 MW machine had failed, we would still have had 2,209 MW of capability to carry a peak load of 1,843 MW.

Table 21 indicates that by the end of 1975 our power plant capability will increase from 2,495 MW as at the end of 1970 to 3,338 MW --five years later. All but 108 MW of this increased capability will be thermal.

Making a detailed forecast for the further five years to 1980 is a little venturesome, but by the end of that year, as we see it at the moment, we will have a power plant capability of about 5,200 MW.

TABLE NO. 21

FORECAST OF NET GENERATING CAPABILITY IN M.W. WITHIN THE INTERCONNECTED SYSTEM

	Net Capability Added During Year	Net Capability At End Of Year	Estimated Peak Load	Minimum Capability Required *
Capability as at December 31, 1970		2,495	1,843	2,129
Capability to be added 1971	-			
Total, December 31, 1971		2,495	2,040	2,326
Capability to be added 1972				
Canadian Utilities - McIntyre	140			
Calgary Power - Bighorn	108			
Total, December 31, 1972	248	2,743	2,295	2,581
Capability to be added 1973				
City of Edmonton	159			
Total, December 31, 1973	159	2,902	2,530	2,834
Capability to be added 1974				
Calgary Power - Sundance	286			
Total, December 31, 1974	286	3,188	2,775	3,108
Capability to be added 1975				
Canadian Utilities - Battle River	150			
Total, December 31, 1975	150	3,338	3,010	3,371

* Estimated Peak Load plus the greater of 12% or the largest unit.

FARM ELECTRIFICATION

For some years now farm electrification lines have extended into even the most remote bays of the farming areas. During 1970 the Commission gave approval to over 800 applications for new services in R.E.A.'s. While all of these had not been built by the end of the year, nevertheless, including some of those approved during 1969 but constructed during 1970, 835 new farm services were built to bring the total farm services put up since the beginning of the program to 65,874.

Although 835 new farm services were built, the number of R.E.A. farms using power at the end of the year only increased by 374. During the year 96 services which had been built over the years were salvaged and there was an increase of 365 in services which were disconnected, temporarily or otherwise, but left standing.

According to the 1966 census Albertans operated 69,411 farms but only lived on 61,997 of them. Since that year, the number of farms on which someone lives has continued to decrease and we estimated that there are now only about 60,000 in that category. There is a discrepancy between this number of farms on which someone lives and the 63,485 farm services which are energized. Any comparison between these figures is complicated by a number of factors: the number of farms from which the farmer has moved off but left the service there and still uses it for some purpose, the varying definitions of a farm including Indian homes on reserves, and the movement of city people to small acreages in the country which, because they own a horse or two or some chickens, the R.E.A.'s consider as farms. For these reasons, it

TABLE NO. 22

FARM ELECTRIFICATION AS AT DECEMBER 31, 1970 (R.E.A.'s ONLY)

	Farm Services Constructed	Services Salvaged Or Transferred To Other Uses	Services With Power Available	Services Disconnected	Farm Services With Power In Use
SOUTHERN AREA					
Calgary Power Ltd.	45,255	408	44,847	4,070	40,777
Canadian Utilities Ltd.	13,432 *	109	13,323	1,579	11,744
Lundbreck Light & Power Co-op	38	2	36	4	32
Southern Area Sub-total	58,725	519	58,206	5,653	52,553
PEACE RIVER AREA					
Canadian Utilities Ltd.	3,552	18	3,534	533	3,001
Northland Utilities Ltd.	3,597	13	3,584	521	3,063
Peace River Area Sub-total	7,149	31	7,118	1,054	6,064
Total R.E.A. Farm Services	65,874	550	65,324	6,708	58,616

* Includes Frog Lake Indian Reserves (49 farms)

is not possible to give meaningful percentages of saturation of farm electrification, but it is over 90 per cent in the Peace River area and close to 100 per cent in the rest of the Province.

In spite of somewhat difficult times, statistics compiled by the Commission show that average consumption of electricity per farm has increased from 8,079 KWH in 1969 to 8,427 KWH during the past year.

The increase in the number of Indian homes or farms on reserves being served by power lines is encouraging. Although the census only shows some 600 Indian farms, over 2,500 Indian homes now have central station service and, as might be expected, the bulk of these are south of the Athabasca River. About 550 Indian homes in reserves are served as customers of the power company, the others are served as R.E.A. customers mainly in the following reserves:

Alexander
Alexis
Beaver Lake
Big Horn
Blood
Blackfoot
Eden Valley
Enoch
Ermineskin
Louis Bull
Montana
Peigan
O'Chiese
Samson
Sunchild
White Whale
Le Goff
Morley

As will be seen from Table 19, while there are 63,485 farms actually using power, the farm electrification lines also serve 11,853 non-farm customers. Of these, 10,654 are served off R.E.A.-owned lines, while the remaining 1,199 obtain their service from company-owned farm lines. The total number of rural customers served by these farm electrification lines is therefore 75,338.

As at the end of December, 1970, there were 47,118 miles of farm line of which 44,061 were owned by the R.E.A.'s.

Financing

At the end of December there were a total of 385 active Rural Electrification Associations. These Associations have borrowed under the Guarantee Act, the Revolving Fund Act and the Long Term Financing Act, and the total of all of these borrowings for new construction has been approximately $58,001,400. At December 31, 1970, about $43,004,500 of this had been paid back. The investment in R.E.A. and other rural lines in the province is slightly under $67,000,000.

During 1970, the Power Commission gave approval to applications for loans under Part I of the Revolving Fund Act or under the Long Term Financing Act amounting to $1,283,200 for service to 817 farms. Of these 817 farms, five of them were in areas where we were able to recommend Part II loans totalling $6,280.00. The framework of lines in these new Part II areas will make it possible for additional farmers to connect to them whenever they are ready.

Since its inception, approvals of loans under Part II legislation have totalled $2,231,268. As at December 31, 1970, $192,218 of this remains outstanding.

Operating Conditions in R.E.A.'s

Even though the construction phase of farm electrification is practically finished, it is still necessary for the power companies to maintain farm construction crews but the nature of their work is changing. As well as doing the tasks necessary to operate the farmers' lines and to perform maintenance on them, the crews are now faced with the work involved in moving lines for road widening, providing increased clearance over graded-up roads and revamping some portions of the R.E.A.'s systems to gear them up to carrying the increasingly large loads being placed on them. The emphasis of farm electrification has changed from being mainly construction to the more or less regular business of operating and revamping R.E.A. systems--some of which are now over twenty years old.

The experience we are having with these systems parallels that of the other lines which the power companies have been operating for several decades. Unfortunately, as in all other construction, the cost of building lines keeps going up. The cost of material and labour keeps increasing but these increases are not so serious as that occasioned by having to move crews around to hook up one or two farmers in each R.E.A. The time and cost incurred by this moving around doing a small job here and another there runs up the cost of separate extensions far beyond what it was a few years ago when many farmers were being hooked up as a group in each R.E.A. The power companies have adjusted their crews and the scheduling of these jobs so that as far as possible a farmer requesting service does not have to wait too long, although, unfortunately in spite of this, some problems still arise.

In all of the years up to 1968, the actual operating costs have been less than the monthly charge made to the farmer in his power bill, so that at the end of each of those years the companies were able to make a refund to the Deposit Reserves of the Associations. Unfortunately, the utmost efficiency in operating these lines is not enough to keep pace with the inflationary rise in material and labour costs. Moreover, as the lines get older, considerable maintenance is becoming

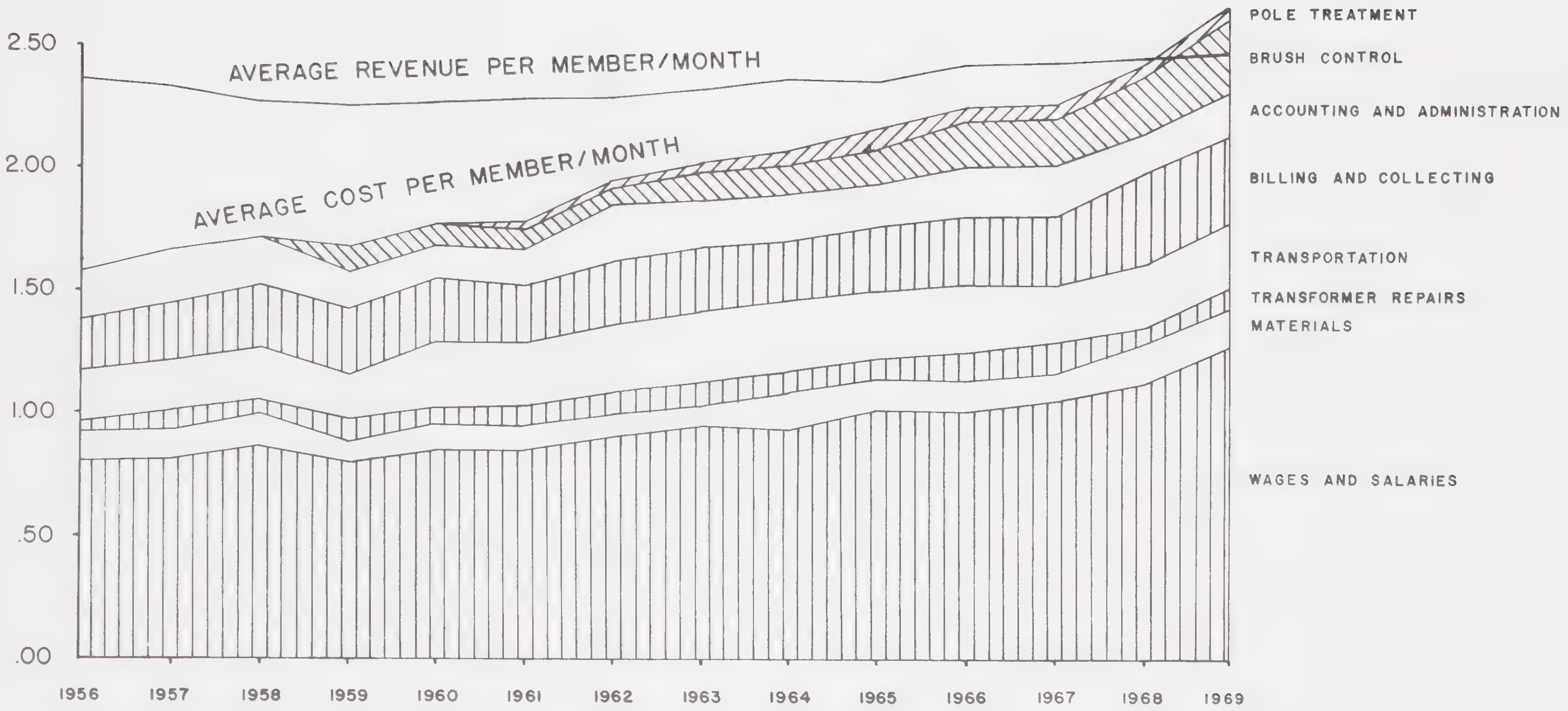


CHART NO. 3 - OPERATING REVENUE AND COMPONENTS OF COST OF OPERATION FOR THE YEARS FROM 1956 - 1969 necessary and this adds to operating expenses.

Excess Operating Refund per Member Month

Year	Farm Electric Services Ltd.	Canadian Utilities Ltd.	Northland Utilities Ltd.
1959	.53	.81	.02
1960	.51	.55	.02
1961	.45	.69	.13
1962	.24	.63	.29
1963	.20	.54	.50
1964	.18	.61	.66
1965	.15	.27	.43
1966	.02	.58	.33
1967	.04	.51	.27
1968	(.18 Deficit)	.54	.35
1969	(.40 Deficit)	.36	.31

Chart No. 3 shows revenue and the components of cost of operation for the years 1956-1969.

The Power Commission has endeavoured to study all phases of farm electrification. The operation of farm lines presents many intricate problems that change as the years go by. In its engineering and accounting aspects, farm electrification is highly technical and the individual R.E.A. does not have the time nor the opportunity to investigate these matters. The Commission feels that one of its main responsibilities is to see that consideration is given to every factor that could possibly reduce the cost of electricity to the farmers, and to improve the efficiency of service.

During 1970, the average use on Alberta farms was 8,427 KWH.

This is more than double the power used per farm ten years ago. While farm consumption has doubled during the past decade, the K.W.H. generated per capita during the same period has increased more rapidly.

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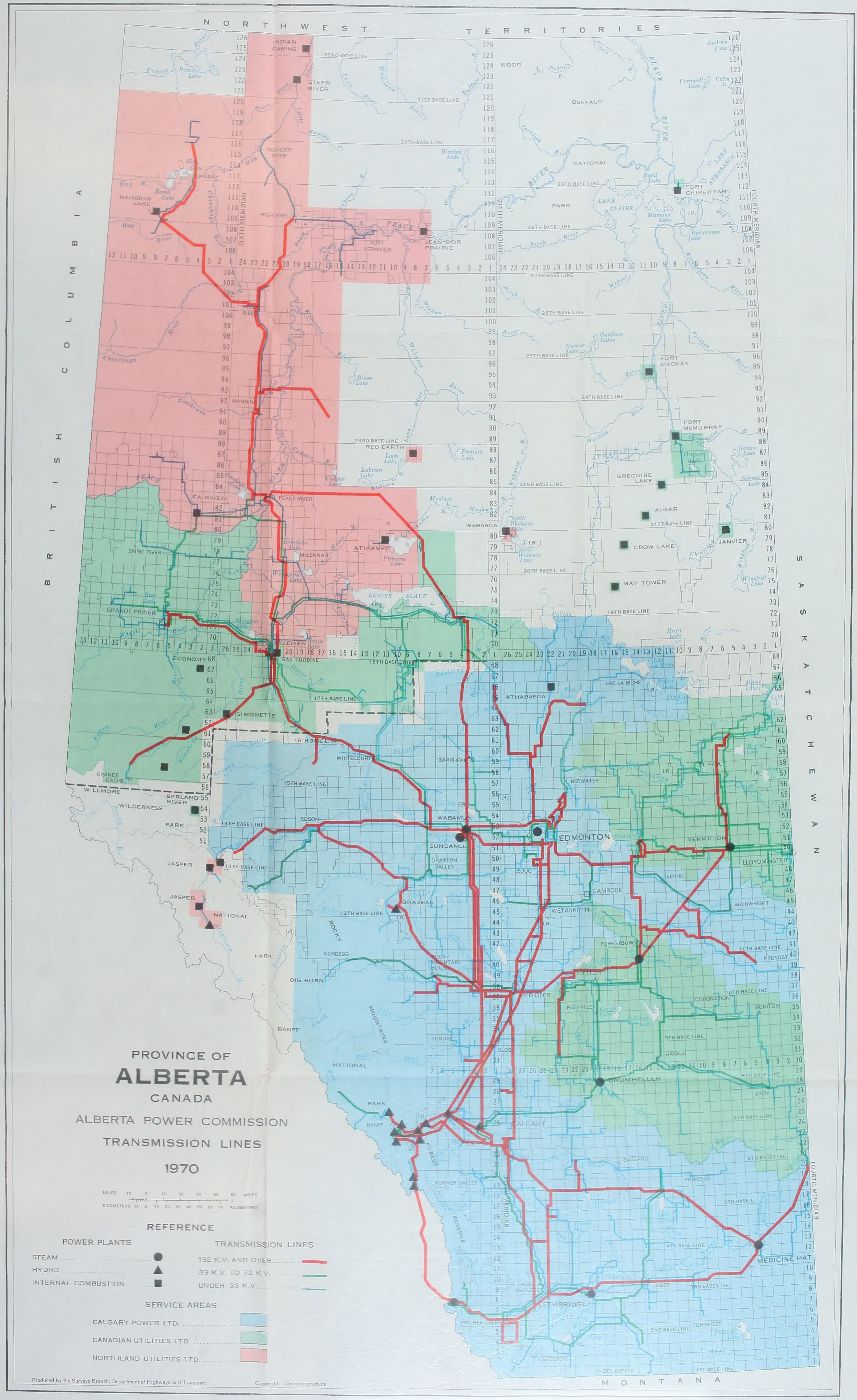

PROVINCE OF
ALBERTA
CANADA
ALBERTA POWER COMMISSION
TRANSMISSION LINES
1970

MILES 10 0 10 20 30 40 50 MILES
KILOMETERS 10 0 10 20 30 40 50 60 70 KILOMETERS

REFERENCE

POWER PLANTS

STEAM	●
HYDRO	▲
INTERNAL COMBUSTION	■

TRANSMISSION LINES

132 K.V. AND OVER	🟥
33 K.V. TO 72 K.V.	🟩
UNDER 33 K.V.	🟦

SERVICE AREAS

CALGARY POWER LTD.	🟦
CANADIAN UTILITIES LTD.	🟩
NORTHLAND UTILITIES LTD.	🟥

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